Nevada Mathematics

Content Standards for Kindergarten and Grades 1 through 8 and 12

As Adopted March 2001
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Nevada Mathematics Standards

Introduction

Comprehensive mathematical knowledge is essential for success in today's world. Society needs individuals who have sound estimation skills and number and spatial sense, who are competent using and interpreting data, and who can use appropriate technology resources to solve problems and make informed decisions. These skills are essential if students are to become successful citizens, life-long learners, and competitive workers in a global market place.

Mathematics is a basic component of every student's education. Within mathematics, technology should be regarded as a tool that can facilitate a student's understanding of quantitative relationships and that can increase computational proficiency in problem-solving situations. In elementary school, calculators are valuable tools as students explore patterns and investigate mathematical situations. Students should not, however, depend on calculators to help them solve basic computation problems. It is critical that students thoroughly develop basic computational skills at a young age. Technology can be used by students to strengthen and extend their understanding of concepts, explore mathematical functions, engage in problem-solving activities, employ real world applications, and verify results of mathematical activities. When technology is combined with a student's understanding of underlying mathematical concepts, learning is enhanced. Technology can support student learning and provide all students with the tools they need to master the Nevada standards.

The *Nevada Mathematics Standards* are intended to establish common expectations for local communities to develop a clear, shared understanding of what all students should know and be able to do at key points in their K-12 educational careers. The document includes five content standards: Numbers, Number Sense, and Computation; Patterns, Functions, and Algebra; Measurement; Spatial Relationships and Geometry; and Data Analysis. Each of these content standards is essential to accomplishing the goals for mathematics education listed below.

<u>Goals of Mathematics Education in Nevada</u>

- the knowledge of basic mathematical facts and relationships and the ability to perform computations;
- the ability to make sound estimations and to make sense of number relationships;
- the ability to read, interpret, and create graphs, tables, and charts;
- the ability to make geometric observations, measurements, and constructions; and
- the ability to understand the effective, appropriate, and efficient use of models and mathematical tools, including calculators and computer technology.

Additionally, these standards include four process standards: Problem Solving, Mathematical Communication, Mathematical Reasoning, and Mathematical Connections. The processes described within these four standards are also carefully integrated within the content standards to emphasize the interconnectedness among the process and content standards. This integration is meant to emphasize the importance of teaching mathematics within the context of an application so students can not only compute but also can use their computational skills to reason and solve problems.

The *Nevada Mathematics Standards* are intended to provide the framework for a comprehensive K-12 mathematics program and are intended to guide curriculum, instruction, and assessment as well as other policies and practices that affect student learning. They will serve as a foundation for teachers and curriculum specialists as they create curriculum and adopt teaching practices relevant to the needs, strengths, and diversity of Nevada's students and communities. The standards will also provide clear direction for meaningful pre-service and in-service professional development. In essence, the standards will help Nevada's school districts build cohesive and comprehensive systems for ensuring that all students achieve at high levels.

This edition of the Nevada Mathematics Standards contains supplemental information not previously included in previous editions. First, suggested interdisciplinary links have been noted at the bottom of each box, when applicable, for grades 2, 3, 5, 8 and 12. Second, for the Benchmark Grades of 2, 3, 5, 8 and 12, each of the benchmark standards were prioritized based on a three-part framework which included Enduring Knowledge, Important Knowledge and Knowledge Worth Being Familiar With. In addition, for each of the benchmark standards in grades 3, 5, 8, and 12, a determination was made as to whether the standard would be assessed locally by school district personnel or through a state assessment. In doing so, it was assumed that all standards would be assessed at the local level but that only some of the standards are appropriate for assessment at the state level. Listed below are the keys to the coding used throughout the document regarding interdisciplinary links by subject area, prioritization framework and assessment level.

KEY TO INTERDISCIPLINARY LINKS
(Located at the bottom of each box, as applicable, for Grades 2, 3, 5, 8, and 12)

C = Civics E = English Language Arts Ec = Economics G = Geography

H = History M = Mathematics S = Science

KEY TO PRIORITY FRAMEWORK AND ASSESSMENT LEVEL

E = Enduring. Complex, engaging, "big ideas," will require more in-depth knowledge.
I = Important to know and do. Students should retain detailed but not extensive knowledge.
W = Worth being familiar with. Students should have awareness of key people, ideas, concepts, and terms.

L = Nevada Academic Standards that are assessable at the local level ONLY.
S = Nevada Academic Standards that are assessable at the state and local levels.

The coding for both the priority framework and the assessment level are located at the top, right hand corner of each box. Priority framework coding is provided for Grades 2, 3, 5, 8, and 12. Assessment level coding is provided for Grades 3, 5, 8, and 12 only. As an example, the letters E/L found at the top right hand corner of a 3rd grade benchmark standard would indicate that the standard requires Enduring knowledge and will only be assessed at the local level.

Numbers, Number Sense, and Computation

Content Standard 1.0: *To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will accurately calculate and use estimation techniques, number relationships, operation rules, and algorithms; they will determine the reasonableness of answers and the accuracy of solutions.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
1.K.1 Use concrete objects to model simple sums and differences.	1.1.1 Identify and model basic addition facts (sums through 10) and the corresponding subtraction facts.	I 1.2.1 Identify and model basic addition facts (sums to 18) and the corresponding subtraction facts; immediately recall basic addition facts (sums through 10) and the corresponding subtraction facts.	E/S 1.3.1 Immediately recall and use addition, subtraction, and multiplication facts to 81.	I/S 1.4.1 Immediately recall and use multiplication and corresponding division facts through 12s.	Facts
		I 1.2.2 Add and subtract multi-**digit**[1] numbers without **regrouping**.	I/S 1.3.2 Add and subtract multi-digit numbers with regrouping.		Application

Digit – A digit is any one of the basic symbols used to write a numeral. For example, the numeral 23 is made up of the digits 2 and 3.

Regrouping – Regrouping occurs in a mathematical operation when numbers are renamed such as 2 tens and 14 ones is renamed as 34 or vice-versa, e.g., "carrying" and "borrowing".

[1] Words in bold text are defined at the bottom of the page.

Content Standard 1.0: Numbers, Number Sense, and Computation

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
	1.1.3 Write, model, and describe one-step addition and subtraction problems.	I 1.2.3 Generate and **solve** one-step addition and subtraction problems based on practical situations.	E/S 1.3.3 Generate and solve 2-step addition and subtraction and 1-step multiplication problems based on practical situations using pencil and paper, mental computation, and estimation.	E/S 1.4.3 Generate and solve 2-step multiplication and division problems based on practical situations using pencil and paper, mental computation, and estimation.	Word Problems and Number Theory
		E 1.2.4 Use decimals to show money amounts.	E/S 1.3.4 Add and subtract decimals using money as a model.	I/S 1.4.4 Multiply and divide money amounts by a one-digit whole number producing a solution with no remainder.	Decimals and Money
1.K.5 Count to 20.	1.1.5 Use the inherent patterns in numbers to **skip count** by 1's, 2's, 5's, and 10's to 100.	W 1.2.5 Use the patterns in numbers to skip count.	I/L 1.3.5 Model and explain multiplication, including as repeated addition.	I/S 1.4.5 Multiply and divide multi-digit numbers by a one-digit number with regrouping, model and explain division including as repeated subtraction.	Computation

Skip Count – To count by multiples of a number (count by twos, fives, tens, etc.)
Solve – To find all the solutions of an equation or other mathematical problem.

Content Standard 1.0: Numbers, Number Sense, and Computation

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
1.K.6 Recognize, read, and write numbers from 0-10.	1.1.6 Read, write, order, and compare numbers from 0-100.		I/L 1.3.6 Read, write, order, and compare numbers from 0-999; read and write number words.	I/S 1.4.6 Read, write, order, and compare **whole numbers**.	Comparison and Ordering
1.K.7 **Estimate** the number of objects in a set to 10 and **verify** by counting; use ordinal positions first to third.	1.1.7 Estimate the number of objects in a set to 10; read and write number words to 10 and use ordinal positions first to tenth.	I 1.2.7 Estimate the number of objects in a set to 20; read and write number words to 20 and use ordinal positions first to twentieth.	W/L 1.3.7 Round to nearest tens and hundreds to determine reasonableness of the answer; read and write number words.	I/S 1.4.7 Use estimation to determine the reasonableness of an answer.	Estimation and Rounding
1.K.8 Match the number of objects to the correct numeral, 0-10.	1.1.8 Use, model, and identify **place value** positions of 1's and 10's.	I 1.2.8 Use, model, and identify place value positions of 1's, 10's, and 100's.	I/S 1.3.8 Use, model, and identify place value positions up to 10,000.	E/S 1.4.8 Use and identify place value positions of whole numbers.	Place value
	1.1.9 Identify and model a whole; identify and model 1/2.	E 1.2.9 Identify, model, and label 1/2 and 1/4 as parts of a whole.	I/S 1.3.9 Model, sketch, and label fractions with **denominators** to 10; write fractions with numbers and words.	E/S 1.4.9 Identify and compare fractions with like denominators using numbers, models, and drawings.	Fractions

Denominator – The part of a fraction that defines the number of parts into which the whole number is divided.
Estimate – To give an approximate and reasonable answer for an arithmetical exercise without the need of calculating the exact answer.
Place Value – The value of a digit as determined by multiplying its face value by its place value. For example, in the numeral 643, the 6 is in the "hundreds place" and represents a value of 600.
Verify – The process of demonstrating or proving that a response is correct.
Whole Numbers – The set of counting numbers and the number zero, i.e., (0, 1, 2, 3, 4…).

Patterns, Functions, and Algebra

Content Standard 2.0: *To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use various algebraic methods to analyze, illustrate, extend, and create numerous representations (words, numbers, tables, and graphs) of patterns, functions, and algebraic relations as modeled in practical situations.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required at the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
		I	I/S	E/S	
2.K.1 Sort and describe objects by similar **attributes**; recognize and replicate a pattern.	2.1.1 Recognize, describe, **extend**, and create simple repeating patterns using symbols, objects, and **manipulatives**.	2.2.1 Recognize, describe, extend, and create repeating and increasing patterns using symbols, objects, and manipulatives; use patterns and their extensions to solve problems.	2.3.1 Recognize, describe, and create patterns using numbers; use number patterns and their extensions to solve problems. S 20.3.2	2.4.1 Identify, describe, and represent numeric and geometric patterns and relationships.	Patterns
		2.2.2 Generate and solve problems based on various numerical sentences; represent mathematical situations using numbers, symbols, and words.			Relationships

Attribute – Characteristic of an object, such as color, shape, size, etc.
Extend (pattern) – To continue a pattern or sequence with the same rules.
Manipulatives – Tools, models, blocks, tiles, and other objects which are used to explore, represent, and extend mathematical ideas and to solve mathematical problems.

Content Standard 2.0: Patterns, Functions, and Algebra

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required at the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
		I 2.2.3 Use **variables** and open sentences to express relationships.	I/S 2.3.3 Identify missing terms and missing numbers in open number sentences involving number facts in addition and subtraction.	I/L 2.4.3 Find solutions to given equalities from a given **replacement set**, (e.g. find the solution to 3 X 7 =_____, given the replacement set {19, 20, 21}).	Variables (Unknowns)
2.K.4 Identify and create sets of objects with unequal amounts, describing them as more or less.	2.1.4 Create, compare, and describe sets of objects as more, less, or equal (amounts).	I 2.2.4 Generate and solve problems based on various numerical sentences; represent mathematical situations using numbers, symbols, and words.	I/S 2.3.4 Complete number sentences with the appropriate words and symbols for addition, subtraction, less than, greater than, and equal to (+, –, <, >, =).		Number Sentences and Equations
					Algebraic Basics[2]
					Linear Equations
		I 2.2.7 Model, explain and solve a number sentence involving addition and subtraction.			Equation Solutions

Replacement Set – A collection of potential values to be used in place of the variable in an open mathematical sentence.
Variable – A variable is a symbol, such as a letter, box, star, etc., used to represent an unknown or undetermined value in an expression or number sentence.

[2] This topic is a placeholder for content taught in subsequent grades.

Measurement

Content Standard 3.0: *To solve problems, communicate, reason and make connections within and beyond the field of mathematics, students will use appropriate tools and techniques of measurement to determine, estimate, record, and verify direct and indirect measurements.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required at the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
3.K.1 Compare and order objects by size communicating their similarities and differences.	3.1.1 Compare and order objects by length and weight, communicating their similarities and differences.	I 3.2.1 Compare and order objects by various measurable **attributes** (e.g., time, temperature, length, weight, **capacity** and **area**) communicating their similarities and differences. S 2.2.1			Comparison and Ordering
	3.1.2 Compare and measure length and weight, using non-standard measurement.	I 3.2.2 Compare objects to standard whole units to find objects that are greater than, less than, and/or equal to a given unit (e.g., inch, yard, centimeter, meter). S 2.2.1	I/S 3.3.2 Select and use appropriate units of measurement; measure to a required degree of **accuracy**, and record results. S 18.3.2; S 23.3.5	E/S 3.4.2 Measure and compare length in inches, feet, yards, and miles to the nearest 1/2, 1/4); measure and compare lengths in metric units (millimeter, centimeter, meter, kilometer; **convert** within each system.	Measurement

Accuracy – Correctness, usually referring to numerical computations. The accuracy of a table may mean either (1) the number of significant digits appearing in the table; (2) the number of correct places in computations made with the table.
Area –The size of a two-dimensional region typically measured in square units.
Capacity – The maximum amount of liquid a container can hold.
Convert – (Within a measurement system.) To change from one unit of measure to another. For example, 1 yard equals 36 inches.

Content Standard 3.0: Measurement

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
			I/L 3.3.3 Estimate and use measuring devices with **standard** and **non-standard units** to measure length, surface area, liquid **volume**, capacity, temperature, and weight, communicating the concepts of more, less, and equivalent. S 3.3.1	I/S 3.4.3 Communicate the difference between **perimeter** and **area**; describe and determine the perimeter of **polygons** and the area of rectangles (including squares).	Estimation and formulas
3.K.4 Identify and sort pennies, nickels, and dimes.	3.1.4 Determine the value of any set of pennies, nickels, and dimes.	E 3.2.4 Determine the value of any given set of coins. Ec 5.2.1	E/S 3.3.4 Read, write, and use money notation determining possible combinations of coins and bills to equal given amounts. Ec 5.3.1	I/S 3.4.4 Determine totals for monetary amounts in problem- solving situations.	Money
				I/L 3.4.5 Describe and determine the perimeter of polygons and the area of rectangles (including squares).	Proportion and Ratio

Area – The size of a region measured in number of square units (i.e., inches squared, square feet).
Non-standard units – Informal units of measure such as hand-full, arm's length, and stride.
Perimeter – The sum of the lengths of the sides of a two-dimensional figure.
Polygon – A simple, closed plane figure with sides consisting of line segments.
Standard Units – Units of measure that have an accepted value like inch, cup, meter, and pound.
Volume – The size of a three-dimensional shape typically measured in cubic units.

Content Standard 3.0: Measurement

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
3.K.6 Recite, in order, the days of the week.	3.1.6 Recite the months of the year in order; use a calendar to identify days, weeks, months, and year; read time to the nearest hour; distinguish between day and night.	E 3.2.6 Read time to the nearest quarter hour; distinguish between A.M. and P.M.	E/S 3.3.6 Tell time to the nearest minute, using analog and digital clocks, and identify elapsed time.		Time

Spatial Relationships and Geometry

Content Standard 4.0: *To solve problems, communicate, and make connections within and beyond the field of mathematics, students will identify, represent, verify, and apply spatial relationships and geometric properties.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
4.K.1 Identify **two-dimensional** shapes (circles, triangles, rectangles including squares) regardless of position.	4.1.1 Name, sort, and sketch two-dimensional shapes (circles, triangles, rectangles including squares) regardless of position.	E 4.2.1 Describe, and compare two dimensional shapes (circles, triangles, rectangles including squares) regardless of position. S 2.2.1	I/S 4.3.1 Describe, sketch, compare, and contrast plane geometric figures. S 2.3.1	I/L 4.4.1 Identify, draw, and classify angles according to their measurement, including **right**, **obtuse**, and acute.	Two–Dimensional Shapes
4.K.2 Use position words (e.g., middle, before, down) to place objects.	4.1.2 Use position words (e.g., between, left, near) to describe location of objects.	E 4.2.2 Compare the size (larger and smaller) of similar two-dimensional figures (e.g., circles, triangles); identify **congruent** shapes. E 9.2.1	W/L 4.3.2 Demonstrate and describe the motion (transformation) of geometric figures as a slide, **rotation**, or a flip.	I/S 4.4.2 Represent concepts of similarity ,congruence, and **symmetry** using transformational motion.	Congruence, Similarity, and Transformations

Congruent – Figures that have the same size and shape.
Obtuse Angle – An angle with a measure that is greater than 90 degrees and less than 180 degrees.
Right Angle – An angle that measures exactly 90 degrees.
Rotation – A transformation obtained by rotating a figure around a given point often referred to as a turn.
Symmetry – When an object can be folded in half to form two mirror objects (line symmetry) or when an object can be rotated less than 360 degrees about a point to coincide with an image of the object (rotational symmetry)
Two–Dimensional – A figure that is two-dimensional is one which can be represented on a coordinate grid.

Content Standard 4.0: Spatial Relationships and Geometry

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
4.K.3 Identify two-dimensional figures (e.g., windows are shaped like rectangles) as they appear in the environment.	4.1.3 Identify and replicate two-dimensional designs that contain a **line of symmetry**.	W 4.2.3 Identify figures with symmetry as they appear in the environment; create two-dimensional designs that contain a line of symmetry.			Coordinate Geometry and Line of Symmetry
		I 4.2.4 Identify, name, sort, describe, two- and three-dimensional geometric figures and objects (e.g., circle/sphere, square/cube). S 2.2.1	I/L 4.3.4 Compare, contrast, sketch, model, and build two- and **three-dimensional** geometric figures and objects. S 2.3.1; S 2.3.2; E 1.3.3	E/S 4.4.4 Identify, describe, and classify two- and three-dimensional figures by relevant properties including the number of **vertices** (corners), **edges**, and shapes of **faces**, using models.	Two- and three-dimensional figures
					Line, Slopes, and Linear Equations

Edge – The place or line where two sides of a figure meet (the edge of a table).
Face – The shape formed by one of the sides of a three-dimensional figure.
Line of Symmetry – When an object can be folded in half to form two mirror objects.
Pyramid – A three-dimensional figure with a flat base and triangular sides that meet in a point**.**
Three–Dimensional – A figure like a cube that has length, width, and height.
Vertex – (Plural is vertices.) The point where two sides of a two-dimensional figure meet or the point where two or more edges of a three-dimensional figure meet.

Content Standard 4.0: Spatial Relationships and Geometry

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
				I/S 4.4.6 Identify, describe, and draw geometric figures including points, **intersecting lines**, **parallel lines**, **line segments**, **rays**, and angles.	Lines, Angles, and Geometric Figures
					Pythagorean Theorem
					Draw and Construct
					Logic and Deductive

Intersecting Lines – Lines that cross and have exactly one point in common.
Line Segments – Part of a line defined by two endpoints.
Parallel Lines – Lines in the same plane that are always the same distance apart.
Ray – A part of a line that has one endpoint and extends endlessly in one direction

Data Analysis

Content Standard 5.0: *To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will collect, organize, display, interpret, and analyze data to determine statistical relationships and probability projections.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the previous grade and:	By the end of **Grade 2,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 3,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 4,** students know and are able to do everything required in the previous grades and:	
5.K.1 Collect and describe data.	5.1.1 Collect, organize, and describe data.	I 5.2.1 Collect, organize, record, and explain classification of data using concrete materials. G 7.2.3; S 21.2.1; S 21.2.2; S 22.2.2; S 24.2.4	I/S 5.3.1 Collect, organize, display, and describe simple data using number lines, **pictographs**, **bar graphs**, and **frequency tables**. E 11.3.4; G 1.3.3; G 4.3.1; G 7.3.3; H 1.3.1; H 1.3.2; S 13.3.2; S 21.3.2; S 22.3.2; S 24.3.4	E/S 5.4.1 Collect, organize, display, describe, and interpret simple data using number lines, pictographs, bar graphs, and frequency tables.	Data Collection and Organization
			I/S 5.3.2 Use concepts of **probability** (e.g., impossible, likely, certain) to make predictions about future events.	I/L 5.4.2 Conduct simple probability experiments using concrete materials and represent the results using fractions.	Probability
					Probability Analysis
					Central Tendency
					Data Analysis
					Design

Bar Graph – A graph that uses horizontal or vertical bars to represent data.
Frequency Table – A listing of data that includes the number of times an item occurs.
Pictograph – A graph that shows numerical information by using picture symbols.
Probability – The number of favorable outcomes compared to the number of possible outcomes of an experiment.

Problem Solving

Process Standard 6.0: *Students will develop their ability to solve problems by engaging in developmentally appropriate problem solving opportunities in which there is a need to use various approaches to investigate and understand mathematical concepts in order to: formulate their own problems; find solutions to problems from everyday situations; develop and apply strategies to solve a wide variety of problems; and integrate mathematical reasoning, communication and connections.*

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="10">E/S
6.1
Select, modify, develop, and apply strategies to solve a variety of mathematical and practical problems and to investigate and understand mathematical concepts.
S 1.2.3; S 1.5.1; S 1.8.1; S 1.8.4; S 1.12.2; S 1.12.4; S 2.12.1; S 3.2.3; S 10.5.2; S 14.8.6; S 19.12.2; S 21.3.1</td></tr>
<tr><td colspan="10">E/S
6.2
Apply previous experience and knowledge to new problem-solving situations.</td></tr>
<tr><td colspan="3">E
6.3
Formulate (own) problems; use various approaches to investigate and solve problems.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">E/L
6.4
Explain and verify results with respect to the original problem.

S 23.2.5; S 23.3.5</td><td colspan="6">E/S
6.5
Verify, interpret, and evaluate results with respect to the original problem situation, determining an efficient strategy for the given situation.
S 21.5.3; S 21.12.3</td></tr>
<tr><td colspan="10">E/L
6.6
Try more than one strategy when the first strategy proves to be unproductive.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="5">E/S
6.7
Apply multi-step, integrated, mathematical problem-solving strategies, persisting until a solution is found or until it is clear that no solution exists.
S 19.12.2</td></tr>
<tr><td colspan="4">E/L
6.8
Apply solutions and strategies from earlier problems to new problem situations.</td><td colspan="6">E/L
6.9
Generalize solutions and strategies from earlier problems to new problem situations.</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="6">E/S
6.10
Interpret and solve a variety of mathematical problems by paraphrasing, identifying necessary and extraneous information, selecting and justifying efficient methods and/or strategies, and ensuring the answer is reasonable.</td></tr>
</table>

Process Standard 6.0: Problem Solving

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="5"></td><td colspan="4">E/L
6.11
Apply combinations of proven strategies and previous knowledge to solve non-routine problems.</td></tr>
<tr><td colspan="5">I/L
6.12
Use technology, including calculators, to understand quantitative relationships, e.g., for skip counting and pattern exploration.</td><td colspan="4"></td></tr>
<tr><td colspan="5"></td><td colspan="4">E/L
6.13
Use technology, including calculators, to solve problems and verify solutions.
S 24.5.5; S 24.8.5</td></tr>
<tr><td colspan="5"></td><td colspan="4">E/L
6.14
Use technology, including calculators, to investigate, define, and describe quantitative relationships such as patterns and functions.
G 7.12.3; S 1.5.1; S 1.12.2; S 1.12.4; S 14.8.6; S 24.5.5; S 24.8.5</td></tr>
</table>

Mathematical Communication

Process Standard 7.0: *Students will develop their ability to communicate mathematically by solving problems in which there is a need to obtain information from the real world through reading,, listening, and observing in order to: translate this information into a mathematical language and symbols; process this information mathematically; and present results in written, oral and visual formats.*

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="10">E/L
7.1
Discuss and exchange ideas about mathematics as a part of learning.
E 10.2.3; E 10.3.3; E 10.5.3; E 10.3.1; E 10.5.1; E 10.12.1; S 23.5.2</td></tr>
<tr><td colspan="10">E/L
7.2
Use inquiry techniques (e.g. discussion, questioning, research, data gathering) to solve mathematical problems.
E 4.2.3; E 10.2.2; E 10.3.2; E 10.5.2; E 10.8.2; E 11.2.1; E 11.3.1; E 11.5.1; E 11.8.1; E 11.12.1; E 11.2.2; S 1.5.1; S 1.8.1; S 1.8.4; S 1.12.4; S 10.5.2; S 14.8.6; S 21.3.1</td></tr>
<tr><td colspan="6"></td><td colspan="4">I/L
7.3
Read expository text to learn about mathematics.
E 1.8.3; E 1.12.3; E 2.12.3; E 4.8.1; E 4.8.2; E 4.8.3</td></tr>
<tr><td colspan="3">E
7.4
Use pictorial representations to identify mathematical operations and concepts.
S 22.2.2</td><td colspan="3">I/S
7.5
Identify and translate key words and phrases that imply mathematical operations.</td><td colspan="4">E/S
7.6
Interpret and solve word problems without the necessity of key words or phrases.</td></tr>
<tr><td colspan="4">E/S
7.7
Use physical materials, models, pictures, or writing to represent and communicate mathematical ideas.
E 6.3.3; G 1.3.3; G 4.2.1; G 4.2.6; G 4.3.1; G 7.2.5; G 7.3.3; G 7.3.5; G 7.2.3; H 1.3.1; H 1.3.2; S 13.3.2; S 20.3.1; S 21.2.1; S 21.2.2; S 21.3.2; S 22.2.2; S 24.2.4; S 24.3.4</td><td colspan="3">E/S
7.8
Use physical material, diagrams, and tables to represent and then communicate mathematical ideas through oral, verbal, and written formats.
E 11.5.5; G 1.5.4; G 7.5.3; G 7.5.5; H 1.5.1; S 1.5.1; S 20.5.1; S 22.5.2; S 23.5.2</td><td colspan="3">E/S
7.9
Model and explain mathematical relationships using oral, written, graphical, and algebraic methods.
E 5.8.1; E 5.8.2; E 6.8.2; E 11.8.5; E 11.12.5; S 1.12.2; S 1.12.4; S 14.8.6; S 20.12.1; S 22.8.2; S 22.12.2</td></tr>
<tr><td colspan="5"></td><td colspan="5">I/L
7.10
Evaluate the effectiveness of written and oral presentations of mathematics.
S 21.5.3; S 23.5.2</td></tr>
<tr><td colspan="4"></td><td colspan="6">E/L
7.11
Make conjectures and present arguments in discussions of mathematical ideas.
E 8.12.2; S 21.12.3</td></tr>
<tr><td colspan="6">W/L
7.12
Explain and justify thinking about mathematical ideas and solutions. E 8.8.2; E 8.12.2; S 19.8.1</td><td colspan="4"></td></tr>
</table>

Conjecture – An idea or theory that has not been proved.

Diagram – A drawing or graphical representation used to illustrate mathematical relationships.

Process Standard 7.0: Mathematical Communication

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 12
						I/L 7.13 Explain and evaluate thinking about mathematical ideas and solutions. E 10.8.2; E 10.12.4; S 21.5.3		I 7.14 Explain and evaluate thinking about mathematical ideas and solutions based on the role of definitions, properties, common rules, and symbols in solving problems.	
E/L 7.15 Use everyday language to explain thinking about strategies and solutions to mathematical problems. S 21.5.3; S 23.5.2									
E/S 7.16 Express mathematical ideas and use them to define, compare, and solve problems orally and in writing.									
E/L 7.17 Use mathematical notation to communicate and explain mathematical situations. S 21.2.1									

Mathematical Reasoning

Process Standard 8.0: *Student will develop their ability to reason mathematically by solving problems in which there is a need to investigate significant mathematical ideas and **construct** their own learning in all content areas in order to justify their thinking; reinforce and extend their logical reasoning abilities; reflect on and clarify their own thinking; and ask questions to extend their thinking.*

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="5">I/L
8.1
Justify and explain the solutions to problems using manipulative and physical models.

S 3.2.3; S 20.3.2</td><td colspan="3">E/S
8.2
Justify answers and the steps taken to solve problems, with and without manipulatives, and physical models.

S 1.5.1; S 10.5.2; S 20.5.1</td><td colspan="2">I/L
8.3
Construct, justify, and defend mathematical conclusions using logical arguments, in situations related to mathematics, science, and technology.
E 10.12.4; G 7.12.4; S 1.8.1; S 1.8.4; S 1.12.4; S 14.8.6</td></tr>
<tr><td colspan="10">E/S
8.4
Use patterns and relationships to analyze mathematical situations; draw logical conclusions about mathematical problems.
Ec 3.8.2; Ec 3.8.3; Ec 9.8.4; Ec 3.12.1; Ec 3.12.2; Ec 3.12.3; Ec 3.12.4; Ec 6.12.6; G 7.12.4; S 17.3.2</td></tr>
<tr><td colspan="4"></td><td colspan="6">E/L
8.5
Follow a logical argument and judge its validity.
E 4.8.4; E 4.12.4</td></tr>
<tr><td colspan="4"></td><td colspan="3">E/S
8.6
Apply deductive and inductive reasoning in mathematical situations to extend logical reasoning.
Ec 3.12.3</td><td colspan="3">E/S
8.7
Recognize and apply deductive and inductive reasoning in both concrete and abstract contexts.</td></tr>
<tr><td colspan="10">E/L
8.8
Ask questions to reflect on, clarify, and extend thinking.</td></tr>
<tr><td colspan="10">I/L
8.9
Review and refine the assumptions and steps used to derive conclusions in mathematical arguments.</td></tr>
</table>

Process Standard 8.0: Mathematical Reasoning

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 12
								I/L 8.10 Construct valid arguments; make and test conjectures about algebraic and geometric properties based on mathematical principles. E 10.12.4	
E/S 8.11 Determine relevant, irrelevant, and/or sufficient information to solve mathematical problems.									

Mathematical Connections

Process Standard 9.0: *Students will develop the ability to make mathematical connections by solving problems in which there is a need to view mathematics as an integrated whole, identifying relationships between context strands, and integrating mathematics with other disciplines, allowing the flexibility to approach problems in a variety of ways within and beyond the field of mathematics.*

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="10">E/L
9.1
Link new concepts to prior knowledge.</td></tr>
<tr><td></td><td colspan="9">E/S
9.2
Use mathematical ideas from one area of mathematics to explain an idea from another area of mathematics.</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="6">E/S
9.3
Use models to explain the relationship of concepts to procedures.
S 1.5.1; S 1.8.1; S 1.12.2; S 1.8.4; S 1.12.4; S 10.5.2; S 14.8.6; S 20.5.1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="4">I/L
9.4
Use the connections among mathematical topics to develop multiple approaches to problems.
S 20.8.1</td></tr>
<tr><td colspan="7">I/L
9.5
Identify practical applications of mathematical principles that can be applied to other disciplines.
S 14.12.5</td><td colspan="3">I/L
9.6
Use and analyze the connections between Mathematics and other disciplines.
Ec 2.8.2; Ec 2.12.4; Ec 2.12.8; H 2.8.3; H 2.12.3; S 2.12.1; S 14.12.5</td></tr>
<tr><td colspan="10">E/L
9.7
Apply mathematical thinking and modeling to solve problems that arise in other disciplines (e.g. rhythm in music and motion in science).
S 1.5.1; S 1.8.1; S 1.12.2; S 1.8.4; S 1.12.4; S 10.5.2; S 14.8.6; S 19.12.2</td></tr>
<tr><td colspan="10">I/S
9.8
Identify, explain, and use mathematics in everyday life.
Ec 2.3.2; Ec 2.12.12; Ec 5.2.1; Ec 5.3.1; S 24.12.2</td></tr>
</table>

Numbers, Number Sense, and Computation

Content Standard 1.0: *To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will accurately calculate, use estimation techniques, number relationships, operation rules, and algorithms; they will determine the reasonableness of answers and the accuracy of solutions.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
E/S 1.5.1 Use and apply multiplication and corresponding division facts through 12's.	I/S 1.6.1 Read, write, add, subtract, multiply, and divide using decimals, fractions, and percents.	I/S 1.7.1 Read, write, and compute **ratios**[2] and **proportions**; read, write, add, subtract, multiply, and divide positive and negative numbers.	I/S 1.8.1 Read, write, add, subtract, multiply, and divide **real numbers** in various forms including **radicals**, exponential, and **scientific notation**. Ec 2.8.2; Ec 9.8.4; H 3.8.4	I/S 1.12.1 **Calculate** and estimate sums, differences, products, quotients, **powers,** and **roots** using mental math, **formulas**, and **algorithms**. S 23.12.3; C 4.12.1	Facts

Algorithm – A rule or procedure used to complete an exercise or solve a problem.
Calculate – (Compute) The process of adding, subtracting, multiplying, dividing, or finding the square root.
Formula – An equation that states a fact or rule (lw = A).
Powers – A term that is used to describe an exponent. For example, the expression 3^4 can be read as 3 to the fourth power.
Proportions – An equation that represents the equality of two ratios.
Radicals – A term used to refer to roots of numbers such as the cube root of 5.
Ratio – A comparison of two quantities or a rate of change.
Real Numbers – The rational numbers and the irrational numbers.
Root – A number that can be used as a factor a given number of times to produce the original number (i.e., the fifth root of 32 is 2 because 2 x 2 x 2 x 2 x 2 = 32).
Scientific Notation – A method of representing a number as a product of a number between 0 and 10 and a power of ten. For example, 3456 can be written as 3.456×10^3.

[2] Words in bold text are defined at the bottom of the page.

Content Standard 1.0: Numbers, Number Sense, and Computation

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
E/S 1.5.2 Generate and solve addition, subtraction, multiplication, and division problems using whole numbers in practical situations. Ec 2.5.2; Ec 9.5.4	E/S 1.6.2 Apply decimals, fractions, and percents to solve mathematical and practical problems.	E/S 1.7.2 Apply positive and negative numbers, ratios, and proportions to solve mathematical and practical problems.	E/S 1.8.2 Compute with **rational** and **irrational numbers** to solve a variety of problems including rates, recipes, unit costs, and percents (e.g., discounts, interest, sale, prices, commissions, taxes). Ec 9.8.4	(I/S) W/L 1.12.2 Apply the laws of **exponents** to perform **operations** on expressions with **integral exponents** and expressions in scientific notation. S 1.12.2	Application
E/S 1.5.3 Use **order of operations** to solve problems.	I/S 1.6.3 Use the concepts of **number theory,** including **prime** and **composite numbers**, factors, **multiples,** and the rules of divisibility.	E/S 1.7.3 Use **absolute value** and the properties of real numbers including distributive, **commutative**, and **associative** to solve problems.	I/L 1.8.3 Explain and apply number theory and the properties of real numbers to solve problems. H 3.8.4	I/S 1.12.3 Apply the properties and theories of the real number system to everyday situations. S 1.12.2; H 3.12.4	Word Problems and Number Theory

Absolute Value – A number's distance from zero on a number line. The absolute value of 2 is equal to the absolute value of –2.
Associative – The property which states that the manner of grouping three or more numbers when added or multiplied does not change the answer (e.g., 2+(3+5) = (2+3)+5).
Commutative - The order in which two numbers are added or multiplied does not change the sum.
Composite Number - A whole number that is the result of at least two numbers (with "1" not one of the numbers) being multiplied together and that can be broken down into factors (20 = 2 * 10).
Exponent – A term that is used to describe the power to which a number or variable is raised. For example, in the expression 3^4, the 4 is referred to as the exponent.
Integral Exponent – An exponent that is a whole number or its opposite. For example, x^4 or y^{-4} have integral exponents, respectively of 4 and –4.
Irrational Numbers – Numbers which have infinite, but non-repeating, decimal representations.
Multiple – A multiple of a number is the product of that number and any whole. For example, 24 is a multiple of 6.
Number Theory – The exploration of properties and characteristics of numbers.
Operation – A term most commonly used to refer to addition, subtraction, multiplication, or division but may also refer to, for example, taking a square root, cubing a number, and intersecting sets.
Order of Operation – A rule used to provide conformity in the results of a string of operations. For example, 3+5x4-2 should be interpreted as equal to 21 because the order of operations requires that we multiply and divide before we add and subtract.
Prime Number – A whole number greater than 1 that has only 1 and itself as factors. For example, 13 is a prime number, 10 is not a prime number.
Rational Number – A number that can be written in the form of a fraction.

Content Standard 1.0: Numbers, Number Sense, and Computation

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/S 1.5.4 Add and subtract decimals; multiply and divide decimals by whole numbers in problems representing practical situations.					Decimals
E/S 1.5.5 Multiply and divide multi-digit numbers by 2-digit numbers, including strategies for powers of 10.	see 1.6.1	see 1.7.1	see 1.8.1	W/L 1.12.5 Perform simple operations on **matrices**.	Computation
I/L 1.5.6 Compare and order negative numbers within the context of everyday happenings (e.g., temperature) and plot those numbers on a number line.	I/S 1.6.6 Compare and order groups of fractions and groups of decimals (e.g., on a number line).	I/S 1.7.6 Compare and order groups containing a mix of fractions, percents, and decimals (e.g., on a number line).	E/S 1.8.6 Compare and order rational numbers.		Comparison and Ordering

Matrices - Plural of matrix. A way of displaying information in an array. For example, the expression $3x^2 + 4x + 2$ can be displayed in a matrix form as [3 4 2].

Content Standard 1.0: Numbers, Number Sense, and Computation

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/L 1.5.7 When **rounding**, identify which place value will be most helpful in estimating an answer and determine the reasonableness of the answer.	E/S 1.6.7 Round to a given decimal place value; estimate using decimals, fractions, and percents.	E/S 1.7.7 Select and round to the appropriate significant digit; estimate using a variety of methods.	E/S 1.8.7 Estimate in problem-solving situations and in practical applications; determine the reasonableness of the answer and verify the results.		Estimation and Rounding
E/S 1.5.8 Use and identify place value.					Place value
E/S 1.5.9 Use models and drawings to identify, compare, add, and subtract fractions with like denominator**s** and to add and subtract decimals; use both to solve problems.	I/S 1.6.9 Use models and drawings to identify, compare, add, and subtract fractions with unlike denominators; use models to translate among fractions, decimals, and percents.	E/S 1.7.9 Translate among fractions, decimals and percents.	E/S 1.8.9 Explain the relationship among fractions, decimals, and percents; translate among various representations of equal numbers (e.g., from fractions to decimals to percents, various forms of "1" such as 3/3 or 16/16) to solve problems efficiently.		Fractions

Rounding Numbers – Expressing a number to the nearest one, nearest ten, nearest hundred and so on.

Patterns, Functions, and Algebra

Content Standard 2.0: *To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use various algebraic methods to analyze, illustrate, extend, and create numerous representations (words, numbers, tables, and graphs) of patterns, functions, and algebraic relations as modeled in practical situations.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/L 2.5.1 Identify, describe, and explain patterns and relationships in the number system (e.g., formed by **triangular numbers**, perfect squares, arithmetic and **geometric sequences**) using concrete materials, paper and pencil, and calculators.	E/S 2.6.1 Use and create tables and charts to extend a **pattern** in order to describe a rule**.**	E/S 2.7.1 Use and create coordinate graphs (i.e., linear, geometric, and exponential) to represent and/or interpret patterns and relationships, with and without calculators.	E/S 2.8.1 Use **inductive reasoning** to find the missing term in number and geometric patterns and to generalize basic patterns to the nth term, with and without calculators; use written, oral, and **symbolic language** to identify and describe patterns, **sequences,** and **functions**.		Patterns

Function – An association of one object (or number) from one group or collection with one and only one object of another group or collection. This association is often represented in words, graphically, or algebraically.

Geometric Sequence – A sequence of numbers in which the next term can by found by multiplying the current term by some number (given the initial term 3 and a multiplier of 2 yields the geometric sequence of 3, 6, 12, 24…).

Inductive Reasoning – A particular type of logic which involves drawing conclusions from several specific, known facts and using them to make generalizations about other, similar situations.

Sequence – A series of numbers that are predictable and can be extended using simple addition or subtraction (4, 7, 10, 13…).

Symbolic Language – Mathematical ideas expressed in a symbol or group of symbols.

Triangular Numbers – The numbers 1,3,6,10....are triangular because they can be expressed by employing the number of dots in successive triangular arrays of dots (this can be thought of as "stair-step numbers" or 1, 1+2, 1+2+3, 1+2+3+4, …).

Content Standard 2.0: Patterns, Functions, and Algebra

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
	I/S 2.6.2 Identify, model, describe, and evaluate relationships using charts and tables, with and without technology.	E/S 2.7.2 Identify, model, describe, and evaluate relationships using graphs, with and without technology.	E/S 2.8.2 Translate among verbal descriptions, graphic, tabular, and algebraic representations of mathematical situations. Ec 3.8.2; S 1.8.1; S 1.8.4; S 14.8.6; S 20.8.2	(E/S) E/L 2.12.2 Represent and solve problems using **discrete** structures including graphs and matrices, with and without technology. Ec 3.12.2; H 4.12.1; H 5.12.1	Relationships
I/S 2.5.3 Using whole numbers as a replacement set, find possible solutions to such inequalities as 8 + 4 > n.		I/S 2.7.3 Evaluate formulas and algebraic expressions for given values of a variable (e.g., A = lw given l = 6, w = 2, then A = 12).	I/S 2.8.3 Identify, model, describe, and evaluate relationships, including functions, using a variety of methods with and without technology.	E/S 2.12.3 Create and use different forms of a variety of equations, proportions, and/or formulas (e.g., I=PRT or R=I/PT), solving for the needed variable as necessary in given situations. H 3.12.4; H 4.12.1; S 1.12.2; S 1.12.4; S 20.12.1; S 23.12.2	Variables (Unknowns)

Discrete Graph – A graph that has discontinuous information that results in breaks in the display (the graph shows the temperatures only for weekdays and not for weekends).

Content Standard 2.0: Patterns, Functions and Algebra

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
E/S 2.5.4 Use variables in open sentences and to describe simple functions and relationships.		I/S 2.7.4 Represent mathematical situations using algebraic language and symbols	I/S 2.8.4 Add and subtract **binomials;** describe the connection between the algebraic process and the arithmetic process.	I/S 2.12.4 Add, subtract, multiply, and factor (1st and 2nd degree) **polynomials**, describing each step in the process and the connection between the algebraic process and the arithmetic process; use simple quadratic equations with integer roots to solve practical and mathematical problems. H 3.12.4; H 4.12.1; S 23.12.2	Number Sentences and Equations
I/S 2.5.5 Generate number sequences given the first term and any basic computation rule (e.g., given a 4 and the rule of add 6, 10, 16, 22, 28, …).		I/L 2.7.5 Combine like terms variable expressions (e.g., 2a+3a=5a).	I/S 2.8.5 Describe how a change in one variable of a mathematical relationship affects the remaining variables using various tools and methods. Ec 3.8.2; Ec 3.8.3; H 3.8.4	E/S 2.12.5 Model practical problems from everyday situations with a variety of models that includes matrices, translating among tabular, symbolic and graphical representations of functions, with and without technology. Ec 3.12.2; Ec3.12.3; Ec 3.12.4; Ec 6.12.6 G 1.12.3; H 3.12.4; H 4.12.1; S 1.12.2	Algebraic Basics

Binomials - Algebraic expressions that can be represented by exactly two unlike terms when simplified, i.e., (2x + 3y).
Polynomials - Algebraic expressions that can be represented by two or more unlike terms when simplified (i.e., $5x + 2y + 3z$).

Content Standard 2.0: Patterns, Functions and Algebra

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
		I/S 2.7.6 Model, identify, and solve **linear equations** and inequalities using concrete and informal methods; relate this process to the order of operations.	E/S 2.8.6 Model, identify, and solve linear equations and inequalities; relate this process to the order of operations. H 3.8.4	(I/S) W/L 2.12.6 Determine the **domain** and **range** of linear relations given a graph or a set of **ordered pairs**; explain their importance in problem s1olving situations. H 5.12.1	Linear Equations
I/L 2.5.7 Solve simple equations using a variety of methods (e.g. **inverse operations**, mental math, and estimate and verify).	I/S 2.6.7 Use a rule to create a table and represent the ordered pairs on a **coordinate grid**.	I/S 2.7.7 Generate and graph a set of ordered pairs to solve a linear equation	I/S 2.8.7 Solve simple linear equations and connect that process to the order of operations. H 3.8.4	(I/L) W/L 2.12.7 Solve systems of two linear equations, both algebraically and graphically; use graphing calculators as a primary tool in solving these problems and to verify solutions found by other methods.	Equation Solutions

Coordinate Grid – A (two-dimensional) flat surface formed by two intersecting number lines, one horizontal and one vertical, which can be used to name any point on the surface by an ordered pair of numbers.
Domain – A collection of potential values to be used in place of the variable in a mathematical sentence describing a relationship.
Inverse Operations – Two operations that undo each other (i.e., addition and subtraction).
Linear Equations - An algebraic equation that describes a straight line.
Ordered Pair – A pair of numbers that gives the location of a point on a coordinate grid. The first number in the ordered pair describes the horizontal reference and the second describes the vertical.
Range – The solutions determined by evaluating a mathematical sentence using its domain.

Measurement

Content Standard 3.0: *To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will use appropriate tools and techniques of measurement to determine, estimate, record, and verify direct and indirect measurements.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
	E/S 3.6.1 Estimate and convert**,** units of measure for length, weight, and **capacity**, within the same measurement system (customary or metric).	E/S 3.7.1 Estimate and convert, units of measure for **mass**, and volume within the same measurement system; compare corresponding units of the two systems.		(I/S) I/L 3.12.1 Convert between customary and metric systems; convert among monetary systems.	Comparison and Ordering
	E/S 3.6.2 Explain how the size of the unit used affects the **precision**; given two measurements of the same object, select the one that is more precise.	W/L 3.7.2 Given a measurement, determine the **greatest possible error**.	I/S 3.8.2 Demonstrate an understanding of precision, error, and **tolerance** in measurement using the appropriate measurement tool to the required degree of accuracy. S 23.8.5	I/S 3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass. S 2.12.1	Measurement

Capacity – The maximum amount of liquid a container can hold.

Greatest Possible Error – The measurement error which results from rounding or estimating a measurement to the nearest specified unit of measure.

Mass – The measure of the amount of matter of an object in the object's mass while an object's weight is a measure of the force with which gravity attracts the object. Although you mass is the same on Earth as it is on the Moon, you weigh more on Earth because the attraction of gravity is greater on Earth.

Precision of Measurement – Precision of measurement tells how finely a measurement is made. The size of the units determines the precision. The smaller the unit, the more precise the measurement.

Tolerance - The allowable error in a given measurement. If a part has a given measure of 5.125" – the error allowable when making the pat may be 0.005" more or less than the actual measure of 5.125". The standard way of writing the tolerance allowed is 5.125 +/- 0.005:, which means that any measure between 5.120" and 5.130" would be acceptable.

Content Standard 3.0: Measurement

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
E/S 3.5.3 Estimate measures of length, volume, capacity, quantity, and weight, communicating degree of accuracy needed and when a more precise measure is required. S 23.5.3	E/S 3.6.3 Estimate, measure to the required degree of accuracy, derive, and apply formulas to find the perimeter, circumference, and **area** of **plane figures**.	I/S 3.7.3 Estimate, measure to the required degree of accuracy, derive, and apply standard formulas to find the volume and surface area of solid figures (e.g., **cylinders**, triangular solids).	E/S 3.8.3 Select and apply appropriate formulas to solve problems; identify the relationship between changes in area and volume and changes in linear measures of figures.	I/S 3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measures (e.g., linear, square units, cubic units); justify and communicate the differences between accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations. S 23.12.8	Estimation and formulas
E/S 3.5.4 Determine totals and change due for monetary amounts in problem-solving situations.				I/L 3.12.4 Use and interpret consumer data (e.g., **amortization tables**, tax tables, and compound interest charts) to make informed financial decisions related to practical applications such as budget. E 4.12.3; Ec 2.12.4; Ec 2.12.5; Ec 2.12.8; Ec 2.12.12	Money

Amortization Table – A table used to display monthly payment costs (principal + interest) based on loan interest rate and the amount of time that will be used to repay the loan.
Area – The size of a region measured in number of square units (i.e., inches squared, square feet).
Cylinder – A three-dimensional figure shaped like a soup can.
Plane Figures – A two-dimensional region.

Content Standard 3.0: Measurement

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/S 3.5.5 Communicate the difference between perimeter and area.	I/S 3.6.5 Use ratios to describe and compare relationships between various objects.	I/S 3.7.5 Write, solve, and apply proportions.	E/S 3.8.5 Apply ratios and proportions to calculate rates and as a method of **indirect measure** (e.g., miles per hour, cost per unit). Ec 2.8.2; S 23.8.1	I/S 3.12.5 Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes to solve problems. S 2.12.1; S 23.12.4	Proportion and Ratio
E/S 3.5.6 Identify equivalent periods of time, including relationships between and among seconds, minutes, hours, days, months, and years (e.g, 60 sec = 1 min).		E/S 3.7.6 Use elapsed time to solve practical problems (e.g., develop schedules, plan trips).			Time

Indirect Measure – A measure found by using a formula or other strategy and not actually measuring something (i.e., finding the height of a tree without actually holding a ruler next to it).

Spatial Relationships and Geometry
Content Standard 4.0: *To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will identify, represent, explain, verify, and apply spatial relationships and geometric properties.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/S 4.5.1 Draw and classify triangles, according to their properties; (e.g., right, scalene, obtuse, equilateral); identify and draw circles and parts of circles, describing the relationships between the various parts (e.g., central angle, **arc**, diameter)	E/S 4.6.1 Measure angles; identify, describe by properties, classify, compare, and draw regular and irregular quadrilaterals; find the sum of the interior angles of triangles and quadrilaterals.	E/S 4.7.1 Identify, describe by properties, classify, compare, and draw regular and irregular polygons; find the sum of the interior angles.		I/S 4.12.1 Identify and use the properties of polygons (including interior and exterior angles) and elements of circles (e.g., angles, arcs, **chords**, **secants** and **tangents**) to solve practical problems. H 3.12.4	Two - Dimensional Shapes

Arc – A connected portion of a circle.
Chord – A straight line segment that connects two sides of a circle, but does not go through the exact center.
Secant –A straight line intersecting the circle at two points.
Tangent –A straight line intersecting the circle at exactly one point.

Content Standard 4.0: Spatial Relationships and Geometry

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/S 4.5.2 Identify shapes that have congruence, similarity, and/or symmetry of figures using a variety of methods including transformational motions (e.g., **translation**/slide, rotation/turn, **reflection**/flip, enlargement/reduction) and models, drawings, and measurement tools.	I/S 4.6.2 Determine actual measurements represented on scale drawings (e.g., maps, blueprints, houseplans).	I/L 4.7.2 Use ratio and proportions to create scale drawings.	E/S 4.8.2 Apply the properties of equality and proportionality to solve problems involving congruent or similar shapes. H 3.8.4		Congruence, Similarity, and Transformations

Reflection – The mirror image of a figure often referred to as a flip.
Translation – Changing the position of an object by sliding it in any direction without rotation or reflection. Translations are often referred to as slides.

Content Standard 4.0: Spatial Relationships and Geometry

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
E/S 4.5.3 Using a grid, identify coordinates for a given point or locate points of given coordinates in the first **quadrant**. G 1.5.1	I/S 4.6.3 Using a coordinate grid, identify coordinates for a given point and locate points of given coordinates; plot geometric shapes in all four quadrants.	I/S 4.7.3 Use coordinate geometry and models to demonstrate geometric transformations including rotate/turn, translate/slide, reflect/flip by finding the ordered pairs that describe the location of the original and the transformed figures.	I/S 4.8.3 Use coordinate geometry and models to change scale (enlarge and reduce).		Coordinate Geometry and Line of Symmetry
E/S 4.5.4 Identify, describe, compare, and classify two and three-dimensional figures by relevant properties including number of vertices (corners), **edges**, and shapes of faces; identify and predict the effects of combining, dividing, and changing shapes into other shapes.	I/L 4.6.4 Make a model of a three dimensional **prism** from a **two-dimensional** drawing and make a two-dimensional drawing of a three-dimensional prism.	I/L 4.7.4 Make a model of a **three-dimensional** figure from a two-dimensional drawing and make a two-dimensional drawing of a three dimensional object			Two and Three Dimensional Figures

Edge – The place or line where two sides of a figure meet (the edge of a table).
Prism – A three-dimensional figure with two opposite bases that are identical polygons and faces that are parallelograms.
Quadrant – Labels for the four regions formed by the axes of a coordinate grid. The first quadrant is the region which includes only positive ordered pairs.
Three-Dimensional – A figure that is three-dimensional is one which has length, height.
Two-Dimensional – A flat figure like a piece of paper. It has length and width, but not height.

Content Standard 4.0: Spatial Relationships and Geometry

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
	I/L 4.6.5 Model **slope** (pitch, **angle of inclination**) using concrete objects and practical examples.	I/S 4.7.5 Use coordinate geometry to represent slope, midpoint, and horizontal and vertical distance.	I/S 4.8.5 Use coordinate geometry to represent and interpret relationships defined by equations and formulas (including distance, midpoint, and slope), with and without technology.	I/S 4.12.5 Use coordinate geometry to graph linear equations, determine slopes of lines, identify parallel and **perpendicular lines** and find possible solutions to sets of equations; use algebraic techniques to solve problems determined by geometric relationships. H 5.12.1	Line, Slopes, and Linear Equations
E/S 4.5.6 Identify, describe, define, and draw geometric figures including points, intersecting, perpendicular and parallel lines, line segment**s**, rays, angles, and planes.	I/S 4.6.6 Draw **complementary** and **supplementary angles**; identify and find measures of complementary and supplementary angles using arithmetic and geometric methods.	I/S 4.7.6 Describe the properties of geometric relationships including parallel lines, perpendicular lines, bisectors, triangles, and quadrilaterals (e.g., properties of angles formed by a **transversal** of parallel lines).	I/S 4.8.6 Form generalizations and **validate** conclusions about properties of geometric shapes including parallel lines, perpendicular lines, bisectors, triangles, and quadrilaterals. H 3.8.4	(I/S) W/S 4.12.6 Use complementary and supplementary angles, congruent angles, vertical angles, angles formed when parallel lines are cut by a transversal, and angles in polygons to solve practical problems. H 3.12.4	Lines, Angles, and Geometric Figures

Angle of Inclination – The positive angle, less than 180 degrees, that measures the steepness of the slope.
Complementary Angles – Two angles whose measures total exactly 90 degrees.
Perpendicular Lines – Two lines that intersect to form right angles.
Slope – The degree of steepness of a line (or curve) as measured by pitch or rise over run.
Supplementary Angles – Two angles whose measures total exactly 180 degrees.
Transversal - The name given to a line that intersects two or more other lines in a given plane.
Validate – To give evidence that a solution or process is correct.

Content Standard 4.0: Spatial Relationships and Geometry

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
	I/L 4.6.7 Determine the measures of missing angles of triangles based on the **Triangle Sum Theorem** (the sum of the interior angles of a triangle equals 180 degrees).	I/S 4.7.7 Model the **Pythagorean Theorem**; solve for the **hypotenuse** using the theorem.	I/S 4.8.7 Verify and explain the Pythagorean Theorem using various methods (e.g., using grid paper, applying it to a missing side of a **right triangle**); determine missing sides and angles of triangles based on properties of their sides and angles. H 3.8.4	I/S 4.12.7 Apply the Pythagorean Theorem, its **converse**, properties of special right triangles, and right triangle trigonometry to solve practical problems. H 3.12.4	Pythagorean Theorem
	W/L 4.6.8 Construct circles, angles, and triangles based on given measurements using a variety of methods (e.g., protractor, paper folding).	W/L 4.7.8 Construct and verify congruent angles, and parallel and perpendicular lines using hand tools.	W/L 4.8.8 Use hand tools, technology, and models to construct figures and bisect angles and line segments; distinguish among **constructions**, sketches and drawings.	(I/S) W/L 4.12.8 Use tools, technology, and models to sketch, draw, and construct geometric figures in order to solve problems and to demonstrate the properties of geometric figures.	Draw and Construct

Construction – The process of creating a figure or diagram, usually with a compass and straightedge, which will satisfy given conditions which describe it. Two axioms are necessary for all constructions (1) one and only one straight line may be drawn between two points and (2) with any given point as the center and any given distance as the radius, a circle may be drawn.

Converse of the Pythagorean Theorem – If the square of one of the sides of a triangle is equal to the sum of the squares of the other two sides of a triangle, then the triangle is a right triangle.

Hypotenuse – The side of a right (90 degree) triangle that is across from the right angle.

Pythagorean Theorem – If a triangle is a right triangle, then the square of the length of one leg added to the square of the length of the other leg is equal to the square of the hypotenuse.

Right Triangles – A triangle in which one angle is equal to 90 degrees.

Triangle Sum Theorem – The sum of the interior angles of any triangle is equal to 180 degrees.

Content Standard 4.0: Spatial Relationships and Geometry

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
				E/S 4.12.9 Construct, justify and defend mathematical conclusions using logical, sequential, **deductive reasoning** supported by established mathematical principles. E 10.12.4	Logic and Deductive Reasoning

Deductive Reasoning – The process of reasoning that starts from statements accepted as true and applied to a new situation to reach a conclusion (i.e., if a+ b = b+ a, 4+5 = 5+4).

Data Analysis

Content Standard 5.0: *To solve problems, communicate, reason, and make connections within and beyond the field of mathematics, students will collect, organize, display, interpret, and analyze data to determine statistical relationships and probability projections.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/S 5.5.1 Collect, organize, read, and interpret data using a variety of graphic representations including tables, line plots, **stem and leaf plots**, scatter plots, **histograms**; use data to draw and explain conclusions and predictions. G 1.5.3; G 1.5.4; G 7.5.3; G 7.5.5; H 2.5.2; S 21.5.1; S 21.5.2; S 21.5.3; SS 22.5.2	I/S 5.6.1 Interpret data using various formats including circle graphs.	E/S 5.7.1 Organize, display, read, and analyze data, with and without technology, using a variety of displays including frequency **distributions** and circle graphs.	E/S 5.8.1 Organize, display, read, and analyze data, with and without technology, using a variety of displays including box and whisker plots. G 1.8.4; G 7.8.3; G 7.8.4; H 2.8.3; S 22.5.2	(I/S) I/L 5.12.1 Use calculators and computers to create and manipulate tables, graphs, and matrices to communicate statistical information; use the shape of graphs of normal distributions to compare and analyze information. G 3.12.4; G 4.12.1; G 7.12.3; H 2.12.2; H 2.12.3; S 22.12.2	Data Collection and Organization

Distribution, Normal – A special type of smooth, symmetrical, bell-shaped distribution of data.

Histogram - Data grouped in intervals with the frequency of occurrence within each interval displayed.

Stem and Leaf Plot - A method of organizing data for the purpose of comparison where the "leaf" is the number in the smallest place value and the "stem" includes the numbers in the larger place values.

Content Standard 5.0: Data Analysis

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
	I/L 5.6.2 Conduct simple probability experiments using concrete materials and represent the results using decimals, percents, and ratios.		I/S 5.8.2 Find the **theoretical probability** of an event using different counting methods (e.g., **tree diagrams**, **sample spaces**, and organized lists) and compare those results with actual (**experimental**) results, differentiating between the probability of an event and the **odds** of an event. S 22.8.3	I/L 5.12.2 Design, conduct, analyze, and communicate the results of multi-stage probability experiments. H 5.12.1	Probability
	E/S 5.6.3 Solve probability problems using a variety of methods including constructing sample spaces and tree diagrams.		I/S 5.8.3 Find the number of combinations possible in given situations using a variety of counting methods.	(I/S) W/L 5.12.3 Distinguish between and apply **permutations** and combinations using a variety of methods, including The Fundamental Counting Principle. H 5.12.1	Probability Analysis

Experimental Probability – The frequency that a particular event occurs when compared to the total number of trials during an experiment.
Odds – Comparison of the number of "favorable outcomes" to the number of "unfavorable outcomes" in a probability experiment.
Permutation – An arrangement of items in which order is important (a list of the possible 1st, 2nd, and 3rd place winners).
Sample Space – A way to list all the possible results, or outcomes, for a probability experiment.
Theoretical Probability – Identifying, using mathematical expectations, the number of possible ways an event can happen compared to all of the possible events.
Tree Diagram – A method of finding all of the possible outcomes of an experiment by systematically listing the possibilities.

Content Standard 5.0: Data Analysis

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/S 5.5.4 Model and then compute **measures of central tendency** including **mean**, **median**, and **mode**.		I/S 5.7.4 Select, use, and graph (when possible) measures of variability including range, distribution and possible outliers.		E/S 5.12.4 Select and use the measures of central tendency such as mean, median, mode and variability including range, distribution and possible outliers that are appropriate for given situations. G 7.12.4; S 20.12.4	Central Tendency
	I/L 5.6.5 Analyze the effect a change of format will have on interpretation of statistical charts and graphs.		E/S 5.8.5 Evaluate arguments that are based on data analysis for accuracy and validity; analyze the effect a change of scale or a change of format will have on statistical charts and graphs. S 19.8.1	E/S 5.12.5 Analyze the validity of statistical conclusions noting various sources of bias, misuse, and abuse of data caused by a wide variety of factors including choices of scale, probability versus odds, inappropriate uses of measures of central tendency, inaccurate curve fitting and inappropriate uses of controls or sample groups. S 19.12.1; S 21.12.2; S 21.12.3; S 23.12.6	Data Analysis

Mean – In a collection of data, the sum of all the data divided by the number of data.
Measures of Central Tendency – Numbers that represent information about cluster and "average" of a collection of data such as mean, median, mode, and geometric mean.
Median - The middle number (or average of the two middle numbers where necessary) in a collection of numbers that are arranged in order from least to greatest.
Mode – The number that occurs most often in a collection of data.

Content Standard 5.0: Data Analysis

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in the previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in the previous grades and:	
I/L 5.5.6 Describe the limitations of various graph formats; select an appropriate type of graph to **accurately** represent the data and justify the selection. G 5.5.6; G 5.5.7; G 7.5.3; G 7.5.5	E/S 5.6.6 Analyze data in a variety of formats to draw conclusions and make predictions	E/S 5.7.6 Given a set of data, interpolate and extrapolate to make and explain predictions.	I/S 5.8.6 Formulate reasonable inferences and projections based on **interpolations** and **extrapolations** of data to solve problems. S 20.8.2; S 23.8.6	I/L 5.12.6 Design, construct, analyze, and select an appropriate type of graph to represent data to communicate the results of statistical experiments (e.g., write a survey question and analyze and communicate the findings). S 22.12.2	Design

Accurate – "Accurate to a certain decimal place" means that all digits preceding and including the given place are correct using a prescribed rounding method. E.g., 1.26 is accurate to two places if obtained from 1.264, or 1.256, or 1.255, using the "round up if 5 or more" rule.
Extrapolation – Estimating the value of a number using the value of known numbers that precede it.
Interpolation – Estimating the value of a number using the value of known numbers on either side of the missing number.

Problem Solving

Process Standard 6.0: *Students will develop their ability to solve problems by engaging in developmentally appropriate problem solving opportunities in which there is a need to use various approaches to investigate and understand mathematical concepts in order to: formulate their own problems; find solutions to problems from everyday situations; develop and apply strategies to solve a wide variety of problems; and integrate mathematical reasoning, communication and connections.*

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="10">E/S
6.1
Select, modify, develop, and apply strategies to solve a variety of mathematical and practical problems and to investigate and understand mathematical concepts.
S 1.2.3; S 1.5.1; S 1.8.1; S 1.8.4; S 1.12.2; S 1.12.4; S 2.12.1; S 3.2.3; S 10.5.2; S 14.8.6; S 19.12.2; S 21.3.1</td></tr>
<tr><td colspan="10">E/S
6.2
Apply previous experience and knowledge to new problem-solving situations.</td></tr>
<tr><td colspan="3">E
6.3
Formulate problems; use various approaches to investigate and solve problems.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">E/L
6.4
Explain and verify results with respect to the original problem.
S 23.2.5; S 23.3.5</td><td colspan="6">E/S
6.5
Verify, interpret, and evaluate results with respect to the original problem situation, determining an efficient strategy for the given situation.
S 21.5.3; S 21.12.3</td></tr>
<tr><td colspan="10">E/L
6.6
Try more than one strategy when the first strategy proves to be unproductive.</td></tr>
<tr><td colspan="4"></td><td></td><td colspan="5">E/S
6.7
Apply multi-step, integrated, mathematical problem-solving strategies, persisting until a solution is found or until it is clear that no solution exists.
S 19.12.2</td></tr>
<tr><td colspan="4">E/L
6.8
Apply solutions and strategies from earlier problems to new problem situations.</td><td colspan="6">E/L
6.9
Generalize solutions and strategies from earlier problems to new problem situations.</td></tr>
<tr><td colspan="4"></td><td colspan="6">E/S
6.10
Interpret and solve a variety of mathematical problems by paraphrasing, identifying necessary and extraneous information, selecting and justifying efficient methods and/or strategies, and ensuring the answer is reasonable.</td></tr>
</table>

Strategy – A method or way of solving a problem.

Process Standard 6.0: Problem Solving

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 12
								E/L 6.11 Apply combinations of proven strategies and previous knowledge to solve non-routine problems.	
I/L 6.12 Use technology, including calculators, to understand quantitative relationships, e.g., for skip counting and pattern exploration.									
					E/L 6.13 Use technology, including calculators, to solve problems and verify solutions. S 24.5.5; S 24.8.5				
					E/L 6.14 Use technology, including calculators, to investigate, define, and describe quantitative relationships such as patterns and functions. G 7.12.3; S 1.5.1; S 1.12.2; S 1.12.4; S 14.8.6; S 24.5.5; S 24.8.5				

Mathematical Communication

Process Standard 7.0: *Students will develop their ability to communicate mathematically by solving problems in which there is a need to obtain information from the real world through reading, listening, and observing in order to: translate this information into a mathematical language and symbols; process this information mathematically; and present results in written, oral and visual formats.*

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="10">E/L
7.1
Discuss and exchange ideas about mathematics as a part of learning.
E 10.2.3; E 10.3.3; E 10.5.3; E 10.3.1; E 10.5.1; E 10.12.1; S 23.5.2</td></tr>
<tr><td colspan="10">E/L
7.2
Use inquiry techniques (e.g. discussion, questioning, research, data gathering) to solve mathematical problems.
E 4.2.3; E 10.2.2; E 10.3.2; E 10.5.2; E 10.8.2; E 11.2.1; E 11.3.1; E 11.5.1; E 11.8.1; E 11.12.1; E 11.2.2; S 1.5.1; S 1.8.1; S 1.8.4; S 1.12.4; S 10.5.2; S 14.8.6; S 21.3.1</td></tr>
<tr><td colspan="6"></td><td colspan="4">I/L
7.3
Read expository text to learn about mathematics.
E 1.8.3; E 1.12.3; E 2.12.3; E 4.8.1; E 4.8.2; E 4.8.3</td></tr>
<tr><td colspan="3">E
7.4
Use pictorial representations to identify mathematical operations and concepts.
S 22.2.2</td><td colspan="3">I/S
7.5
Identify and translate key words and phrases that imply mathematical operations.</td><td colspan="4">E/S
7.6
Interpret and solve word problems without the necessity of key words or phrases.</td></tr>
<tr><td colspan="4">E/S
7.7
Use physical materials, models, pictures, or writing to represent and communicate mathematical ideas.
E 6.3.3; G 1.3.3; G 4.2.1; G 4.2.6; G 4.3.1; G 7.2.5; G 7.3.3; G 7.3.5; G 7.2.3; H 1.3.1; H 1.3.2; S 13.3.2; S 20.3.1; S 21.2.1; S 21.2.2; S 21.3.2; S 22.2.2; S 24.2.4; S 24.3.4</td><td colspan="3">E/S
7.8
Use physical material, diagrams, and tables to represent and then communicate mathematical ideas through oral, verbal, and written formats.
E 11.5.5; G 1.5.4; G 7.5.3; G 7.5.5; H 1.5.1; S 1.5.1; S 20.5.1; S 22.5.2; S 23.5.2</td><td colspan="3">E/S
7.9
Model and explain mathematical relationships using oral, written, graphical, and algebraic methods.
E 5.8.1; E 5.8.2; E 6.8.2; E 11.8.5; E 11.12.5; S 1.12.2; S 1.12.4; S 14.8.6; S 20.12.1; S 22.8.2; S 22.12.2</td></tr>
<tr><td colspan="4"></td><td colspan="2"></td><td colspan="4">I/L
7.10
Evaluate the effectiveness of written and oral presentations of mathematics.
S 21.5.3; S 23.5.2</td></tr>
<tr><td colspan="4"></td><td colspan="6">E/L
7.11
Make conjectures and present arguments in discussions of mathematical ideas.
S 21.5.3; S 23.5.3</td></tr>
<tr><td colspan="6">W/L
7.12
Explain and justify thinking about mathematical ideas and solutions.
E 8.8.2; E 8.12.2; S 19.8.1</td><td colspan="4"></td></tr>
</table>

Process Standard 7.0: Mathematical Communication

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 12
						I/L 7.13 Explain and evaluate thinking about mathematical ideas and solutions. E 10.8.2; E 10.12.4; S 21.5.3		I 7.14 Explain and evaluate thinking about mathematical ideas and solutions based on the role of definitions, properties, common rules, and symbols in solving problems.	
E/L 7.15 Use everyday language to explain thinking about strategies and solutions to mathematical problems. S 21.5.3; S 23.5.3									
E/S 7.16 Express mathematical ideas and use them to define, compare, and solve problems orally and in writing.									
E/L 7.17 Use mathematical notation to communicate and explain mathematical situations. S 21.2.1									

Mathematical Reasoning

Process Standard 8.0: *Student will develop their ability to reason mathematically by solving problems in which there is a need to investigate significant mathematical ideas and **construct** their own learning in all content areas in order to justify their thinking; reinforce and extend their logical reasoning abilities; reflect on and clarify their own thinking; and ask questions to extend their thinking.*

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="5">I/L
8.1
Justify and explain the solutions to problems using manipulative and physical models.

3.2.3; S 20.3.3</td><td colspan="3">E/S
8.2
Justify answers and the steps taken to solve problems, with and without manipulatives and physical models.

S 1.5.1; S 10.5.2; S 20.5.1</td><td colspan="2">I/L
8.3
Construct, justify, and defend mathematical conclusions using logical arguments, in situations related to mathematics, science, and technology.
E 10.12.4; G 7.12.4; S 1.8.1; S 1.8.4; S 1.12.4; S 14.8.6</td></tr>
<tr><td colspan="10">E/S
8.4
Use patterns and relationships to analyze mathematical situations; draw logical conclusions about mathematical problems.
Ec 3.8.2; Ec 3.8.3; Ec 9.8.4; Ec 3.12.1; Ec 3.12.2; Ec 3.12.3; Ec 3.12.4; Ec 6.12.6; G 7.12.4; S 17.3.2</td></tr>
<tr><td colspan="4"></td><td colspan="6">E/L
8.5
Follow a logical argument and judge its validity.
E 4.8.4; E 4.12.4</td></tr>
<tr><td colspan="4"></td><td colspan="3">E/S
8.6
Apply deductive and inductive reasoning in mathematical situations to extend logical reasoning.
Ec 3.12.3</td><td colspan="3">E/S
8.7
Recognize and apply deductive and inductive reasoning in both concrete and abstract contexts.</td></tr>
<tr><td colspan="10">E/L
8.8
Ask questions to reflect on, clarify, and extend thinking.</td></tr>
<tr><td colspan="10">I/L
8.9
Review and refine the assumptions and steps used to derive conclusions in mathematical arguments.</td></tr>
</table>

Process Standard 8.0: Mathematical Reasoning

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 12
								I/L 8.10 Construct valid arguments; make and test conjectures about algebraic and geometric properties based on mathematical principles. E 10.12.4	
E/S 8.11 Determine relevant, irrelevant, and/or sufficient information to solve mathematical problems.									

Mathematical Connections

Process Standard 9.0: *Students will develop the ability to make mathematical connections by solving problems in which there is a need to view mathematics as an integrated whole, identifying relationships between context strands, and integrating mathematics with other disciplines, allowing the flexibility to approach problems in a variety of ways within and beyond the field of mathematics.*

<table>
<tr><th>Kindergarten</th><th>Grade 1</th><th>Grade 2</th><th>Grade 3</th><th>Grade 4</th><th>Grade 5</th><th>Grade 6</th><th>Grade 7</th><th>Grade 8</th><th>Grade 12</th></tr>
<tr><td colspan="10">E/L
9.1
Link new concepts to prior knowledge.</td></tr>
<tr><td></td><td colspan="9">E/S
9.2
Use mathematical ideas from one area of mathematics to explain an idea from another area of mathematics.</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="6">E/S
9.3
Use models to explain the relationship of concepts to procedures.
S 1.5.1; S 1.8.1; S 1.12.2; S 1.8.4; S 1.12.4; S 10.5.2; S 14.8.6; S 20.5.1</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="4">I/L
9.4
Use the connections among mathematical topics to develop multiple approaches to problems.
S 20.8.1</td></tr>
<tr><td colspan="7">I/L
9.5
Identify practical applications of mathematical principles that can be applied to other disciplines.

S 14.12.5</td><td colspan="3">I/L
9.6
Use and analyze the connections between Mathematics and other disciplines.
Ec 2.8.2; Ec 2.12.4; Ec 2.12.8; H 2.8.3; H 2.12.3; S 2.12.1; S 14.12.5</td></tr>
<tr><td colspan="10">E/L
9.7
Apply mathematical thinking and modeling to solve problems that arise in other disciplines (e.g. rhythm in music and motion in science).
S 1.5.1; S 1.8.1; S 1.12.2; S 1.8.4; S 1.12.4; S 10.5.2; S 14.8.6; S 19.12.2</td></tr>
<tr><td colspan="10">I/S
9.8
Identify, explain, and use mathematics in everyday life.
Ec 2.3.2; Ec 2.12.12; Ec 5.2.1; Ec 5.3.1; S 24.12.2</td></tr>
</table>

Glossary for Mathematics

Absolute Value	A number's distance from zero on a number line. The absolute value of 2 is equal to the absolute value of –2.
Acute Angle	An angle that measures less than 90 degrees.
Accuracy	Correctness, usually referring to numerical computations. The accuracy of a table may mean either (1) the number of significant digits appearing in the table; (2) the number of correct places in computations made with the table.
Accurate	"Accurate to a certain decimal place" means that all digits preceding and including the given place are correct using a prescribed rounding method. E.g., 1.26 is accurate to two places if obtained from 1.264, or 1.256 or 1.255, using the "round up if 5 or more" rule.
Algorithm	A rule or procedure used to complete an exercise or solve a problem.
Amortization Table	A table used to display monthly payment costs (principal + interest) based on loan interest rate and the amount of time that will be used to repay the loan.
Angle of Inclination	The positive angle, less than 180 degrees, that measures the steepness of the slope.
Arc	A connected portion of a circle.
Area	The size of a two-dimensional region typically measured in square units.
Associative	The property which states that the manner of grouping three or more numbers when added or multiplied does not change the answer (e.g., 2+(3+5) = (2+3)+5).
Attribute	A characteristic of an object, such as color, shape, size, etc.
Bar Graph	A graph that uses horizontal or vertical bars to represent data.
Binomials	Algebraic expressions that can be represented by exactly two unlike terms when simplified, i.e., (2x + 3y).
Box and Whisper Plot	A graphic method used to display the middle (median) of a set of data, the middle of each half of that data, and the extremes of the data.
Calculate	(Compute) The process of adding, subtracting, multiplying, dividing or finding the square root of an equation/problem.
Capacity	The maximum amount of liquid a container can hold.
Chord	A straight line segment that connects two sides of a circle, but does not go through the exact center.
Commutative	The order in which two numbers are added or multiplied does not change the sum.
Complementary	Two angles whose measures sum exactly 90 degrees.

Composite Number	A whole number that is the result of at least two numbers (with "1" not one of the numbers) being multiplied together and that can be broken down into factors (i.e., 20 = 2 * 10).
Congruent	Figures that have the same size and shape.
Conjecture	An idea or theory that has not been proved.
Construction	The process of creating a figure or diagram, usually with a compass and straightedge, which will satisfy given conditions which describe it. Two axioms are necessary for all constructions (1) one and only one straight line may be drawn between two points and (2) with any given point as the center and any given distance as the radius, a circle may be drawn.
Converse of the Pythagorean Theorem	If the square of one of the sides of a triangle is equal to the sum of the squares of the other two sides of a triangle, then the triangle is a right triangle.
Convert	(Within a measurement system.) To change from one unit of measure to another. For example, 1 yard equals 36 inches.
Coordinate Grid	A (two-dimensional) flat surface formed by two intersecting number lines, one horizontal and one vertical, which can be used to name any point on the surface by an ordered pair of numbers.
Cylinder	A three-dimensional figure shaped like a soup can.
Deductive Reasoning	The process of reasoning that starts from statements accepted as true and applied to a new situation to reach a conclusion (i.e., if a+b = b+a, 4+5 = 5+4).
Denominator	The part of a fraction that defines the number of parts into which the whole number is divided.
Discrete Graph	A graph that has discontinuous information that results in breaks in the display (the graph shows the temperatures only for weekdays and not for weekends).
Diagram	A drawing or graphical representation used to illustrate mathematical relationships.
Digit	A digit is any one of the basic symbols used to write a numeral. For example, the numeral 23 is made up of the digits 2 and 3.
Distribution, Normal	A special type of smooth, symmetrical, bell-shaped distribution of data.
Domain	A collection of potential values to be used in place of the variable in a mathematical sentence describing a relationship.
Edge	The line formed when two faces of a three-dimensional figure intersect.
Empirical Statement	A statement that is based upon observation and experimental evidence.
Estimate	To give an approximate and reasonable answer for an arithmetical exercise without the need of calculating the exact answer.
Experimental Probability	The frequency that a particular event occurs when compared to the total number of trials during an experiment.

Exponent	A term that is used to describe the power to which a number or variable is raised. For example, in the expression 3^4, the 4 is referred to as the exponent.
Extend (pattern)	To continue a pattern or sequence with the same rules.
Extrapolation	Estimating the value of a number using the value of known numbers that precede it.
Face	The shape formed by one of the sides of a three-dimensional figure.
Face Value	The value assigned to each digit (0,1,2,3,4,etc.) used in our number system.
Formula	An equation that states a fact or rule (lw = A).
Frequency Table	A listing of data that includes the number of times an item occurs.
Function	An association of one object (or number) from one group or collection with one and only one object of another group or collection. This association is often represented in words, graphically, or algebraically.
Geometric Sequence	A sequence of numbers in which the next term can by found by multiplying the current term by some number (given the initial term 3 and a multiplier of 2 yields the geometric sequence of 3, 6, 12, 24…).
Greatest Possible Error	The measurement error which results from rounding or estimating a measurement to the nearest specified unit of measure.
Histogram	Data grouped in intervals with the frequency of occurrence within each interval displayed.
Hypotenuse	The side of a right (90 degree) triangle that is across from the right angle.
Indirect Measure	A measure found by using a formula or other strategy and not actually measuring something (i.e., finding the height of a tree without actually holding a ruler next to it).
Inductive Reasoning	A particular type of logic which involves drawing conclusions from several specific, known facts and using them to make generalizations about other, similar situations.
Integers	Positive and negative whole numbers.
Integral Exponent	An exponent that is a whole number or its opposite. For example, x^4 or y^{-4} have integral exponents, respectively of 4 and –4.
Interpolation	Estimating the value of a number using the value of known numbers on either side of the missing number.
Intersecting Lines	Lines that cross and have exactly one point in common.
Inverse Operations	Two operations that undo each other (i.e., addition and subtraction).
Irrational Numbers	Numbers which have infinite, but non-repeating, decimal representations.

Line of Symmetry	When an object can be folded in half to form two mirror objects.
Line Segments	Part of a line defined by two endpoints.
Linear Equation	An algebraic equation that describes a straight line.
Manipulatives	Tools, models, blocks, tiles, and other objects which are used to explore, represent and extend mathematical ideas and to solve mathematical problems.
Mass	The measure of the amount of matter of an object in the object's mass while an object's weight is a measure of the force with which gravity attracts the object. Although you mass is the same on Earth as it is on the Moon, you weigh more on Earth because the attraction of gravity is greater on Earth.
Mathematical Modeling	Representing or showing mathematical ideas and relationships using objects, pictures, graphs, equations and other methods.
Matrices	Plural of matrix. A way of displaying information in an array. For example, the expression $3x^2 + 4x + 2$ can be displayed in a matrix form as [3 4 2].
Mean	In a collection of data, the sum of all the data divided by the number of data.
Measures of Central Tendency	Numbers that represent information about cluster and "average" of a collection of data such as mean, median, mode, and geometric mean.
Median	The middle number (or the average of the two middle numbers when necessary) in a collection of numbers that are arranged in order from least to greatest.
Mode	The number that occurs most often in a collection of data.
Multiple	A multiple of a number is the product of that number and any whole number. For example, 24 is a multiple of 6.
Multiplicative Inverses	Two numbers whose product is one ($7 * 1/7 = 1$).
Non-Standard Units	Informal units of measure such as hand-full, arm's length, and stride.
Number Theory	The exploration of properties and characteristics of numbers.
Obtuse Angle	An angle with a measure that is greater than 90 degrees and less than 180 degrees.
Odds	Comparison of the number of "favorable outcomes" to the number of "unfavorable outcomes" in a probability experiment.
Odd Number	A whole number that has 1,3,5,7, or 9 in the ones place.
Operation	A term most commonly used to refer to addition, subtraction, multiplication, and division but may also refer to, for example, taking a square root, cubing a number, and intersecting sets.

Order of Operation	A rule used to provide conformity in the results of a string of operations. For example, 3+5x4-2 should be interpreted as equal to 21 because the order of operations requires that we multiply and divide before we add and subtract.
Ordered Pair	A pair of numbers that give the location of a point on a coordinate grid. The first number in the ordered pair describes the horizontal reference and the second describes the vertical.
Parallel Lines	Lines in the same plane that are always the same distance apart.
Perimeter	The sum of the lengths of the sides of a two-dimensional figure.
Permutation	An arrangement of items in which order is important (i.e., a list of the possible 1^{st} , 2^{nd}, and 3^{rd} place winners).
Perpendicular Lines	Two lines that intersect to form right angles.
Pictograph	A graph that shows numerical information by using picture symbols.
Place Value	The value of a digit as determined by multiplying its face value by its place value. For example, in the numeral 643, the 6 is in the "hundreds place" and represents a value of 600.
Plane Figure	A two-dimensional region.
Polygon	A simple, closed plane figure with sides consisting of line segments.
Polynomials	Algebraic expressions that can be represented by two or more unlike terms when simplified (i.e., $5x + 2y + 3z$).
Powers	A term that is used to describe an exponent. For example, the expression 3^4 can be read as 3 to the fourth power.
Powers of Ten	The expressions 10^0, 10^1, 10^2, 10^3, … are powers of ten and represent the numbers 1, 10, 100, 1000,…respectively.
Precision of Measurement	Precision of measurement tells how finely a measurement is made. The size of the units determines the precision. The smaller the unit, the more precise the measurement.
Prime Number	A whole number greater than 1 that has only 1 and itself as factors. For example, 13 is a prime number, 10 is not a prime number.
Prism	A three-dimensional figure with two opposite bases that are identical polygons and faces that are parallelograms.
Probability	The number of favorable outcomes compared to the number of possible outcomes of an experiment.
Proportions	An equation that represents the equality of two ratios.
Pyramid	A three dimensional figure with a flat base and triangular sides that meet in a point.
Pythagorean Theorem	If a triangle is a right triangle, then the square of the length of one leg added to the square of the length of the other leg is equal to the square of the hypotenuse.

Quadrant	Labels for the four regions formed by the axes of a coordinate grid. The first quadrant is the region which includes only positive ordered pairs.
Radicals	A term used to refer to roots of numbers such as the cube root of 5.
Range	The solutions determined by evaluating a mathematical sentence using its domain.
Ratio	A comparison of two quantities or a rate of change.
Rational Number	A number that can be written in the form of a fraction.
Ray	A part of a line that has one endpoint and extends endlessly in one direction.
Real Numbers	The rational numbers and the irrational numbers.
Reflection	The mirror image of a figure often referred to as a flip.
Regrouping	Regrouping occurs in a mathematical operation when numbers are renamed such as 2 tens and 14 ones is renamed as 34 or vice-versa, e.g., "carrying" and "borrowing".
Replacement Set	A collection of potential values to be used in place of the variable in an open mathematical sentence.
Right Angle	An angle that measures exactly 90 degrees.
Right Triangle	A triangle in which one angle is a right angle (equal to 90 degrees).
Root	A number that can be used as a factor a given number of times to produce the original number (i.e., the fifth root of 32 is 2 because 2 x 2 x 2 x 2 x 2 = 32).
Rotation	A transformation obtained by rotating a figure around a given point often referred to as a turn.
Rounding Numbers	Expressing a number to the nearest one, nearest ten, nearest hundred and so on.
Sample Space	A way to list all the possible results or outcomes for a probability experiment.
Scientific Notation	A method of representing a number as a product of a number between 0 and 10 and a power of ten. For example, 3456 can be written as 3.456×10^3.
Secant	A straight line intersecting the circle at two points.
Sequence	A series of numbers that are predictable and can be extended using simple addition or subtraction (4, 7, 10, 13…).
Skip Count	To count by multiples of a number (count by two, five, tens, etc.)

Slope	The degree of steepness of a line (or curve) as measured by pitch or rise over run.
Solve	To find all the solutions of an equation or other mathematical problem.
Standard Units	Units of measure that have an accepted value like inch, cup, meter, and pound.
Stem and Leaf Plot	A method of organizing data for the purpose of comparison where the "leaf" is the number in the smallest place value and the "stem" includes the numbers in the larger place values.
Strategy	A method or way of solving a problem.
Substitution Algebra	Substituting or replacing something, a variable or an expression, in one equation with an equivalent expression from the other equation.
Supplementary Angles	Two angles whose measures total exactly 180 degrees.
Symbolic Language	Mathematical ideas expressed in a symbol or group of symbols.
Symmetry	When an object can be folded in half to form two mirror objects (line symmetry) or when an object can be rotated less than 360 degrees about a point to coincide with an image of the object (rotational symmetry).
Tangent	A straight line intersecting the circle at exactly one point.
Tessellation	A covering of a plane with congruent shapes that exactly cover the area (tiling).
Theoretical Probability	Identifying, using mathematical expectations, the number of possible ways an event can happen compared to all of the possible events.
Three-Dimensional	A figure that is three-dimensional is one which has length, height, and breadth.
Tolerance	The allowable error in a given measurement. If a part has a given measure of 5.125" – the error allowable when making the pat may be 0.005" more or less than the actual measure of 5.125". The standard way of writing the tolerance allowed is 5.125 +/- 0.005:, which means that any measure between 5.120" and 5.130" would be acceptable.
Translation	Changing the position of an object by sliding it in any direction without rotation or reflection. Translations are often referred to as slides.
Transversal	The name given to a line that intersects two or more other lines in a given plane.
Tree Diagram	A method of finding all of the possible outcomes of an experiment by systematically listing the possibilities.
Triangular Numbers	The numbers 1, 3, 6, 10... are triangular because they can be expressed by employing the number of dots in successive triangular arrays of dots (this can be thought of as 1, 1+2, 1+2+3, 1+2+3+4, …).
Triangle Sum Theorem	The sum of the interior angles of any triangle is equal to 180 degrees.
Two-Dimensional	A figure that is two-dimensional is one which can be represented on a coordinate grid.

Validate	To give evidence that a solution or process is correct.
Variable	A variable is a symbol, such as a letter, box, star, etc., used to represent an unknown or undetermined value in an expression or number sentence.
Verify	The process of demonstrating or proving that a response is correct.
Vertex	(Plural is vertices.) The point where two sides of a two-dimensional figure meet or the point where two or more edges of a three-dimensional figure meet.
Volume	The size of a three-dimensional shape typically measured in cubic units.
Whole Numbers	The set of natural numbers plus the number zero, i.e., (0, 1, 2, 3, 4...).